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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/619,203 | 07/14/2003 | Chee Wei Wong | MIT.9721 | 6373 |
| 55740 | 7590 | 08/31/2005 | EXAMINER | |
| GAUTHIER & CONNORS, LLP 225 FRANKLIN STREET BOSTON, MA 02110 | | | KANG, JULIANA K | |
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Please find below and/or attached an Office communication concerning this application or proceeding.

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|------------------------------|--------------------------------------|------------------------------------|--|
| Office Action Summary | Application No. 10/619,203 | Applicant(s) WONG ET AL. | |
| | Examiner Juliana K. Kang | Art Unit 2874 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 7/1/05 (RCE).
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

1. The request filed on July 1, 2005 for a Request for Continued Examination (RCE) under 37 CFR 1.114 is acceptable and a RCE has been established. An action on the RCE follows.

Double Patenting

2. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

3. Claims 1, 3, 4, 11, 13 and 14 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-24 of U.S. Patent No. 6,751,368 B2. Regarding claims 1 and 11, although the conflicting claims are not identical, they are not patentably distinct from each other because claims 1-24 of the patent recite all of the structure recited in claims 1 and 11 of the present application plus additional structure. Although the claims are not identical, broader claims 1 and 11 of the present application are rendered obvious by the more specific claims of 1-24 of the patent. Regarding the term, deformable membrane structure, recited in the application is essentially same as the recited limitation of the stress

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member comprising a layer of material that changes shape in the patent. Regarding claims 3, 4, 13 and 14, Lim et al teach a waveguide micro-resonator but do not teach a microring or microracetrack resonator. A microring or microracetrack resonator are well known shapes of micro-resonators thus, it would have been obvious to one having ordinary skill in the art to use any shapes including microring or microracetrack resonator in Lim et al.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

5. Claims 1, 3, 11 and 13 are rejected under 35 U.S.C. 102(a) as being anticipated by Lim et al (WO 02/25338 A2, submitted by applicant).

Lim et al disclose a waveguide micro-resonator (802) comprising a deformable membrane structure (808, Lim et al's stress element changes shape thus, it is a deformable membrane) that can experience strain (page 19 line 13); and a waveguide element formed on said membrane structure so that when said membrane structure is strained, said waveguide element is tuned to selective amount (page 19 lines 17-19). Please note, regarding the method claims above, that method claims 11 and 13 parallel article claims 1 and 3 exactly without the introduction of any particular manufacturing methods, sot that it is proper to examiner the article and method claims together.

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6. Claims 1, 5-7, 10, 11, 15-17, and 20 are rejected under 35 U.S.C. 102(a) as being anticipated by Matsuura et al (WO 02/10843 A2, submitted by applicant).

Regarding claims 1 and 11, Matsuura et al disclose a photonic device comprising a membrane structure (support, Matsuura et al show the support structure that changes shape in Fig. 4) that can experience strain (see page 7 lines 2-9); and a waveguide element formed on said membrane structure so that when said membrane structure is strained, said waveguide element is tuned to a selective amount (see page 6 lines 16-22, page 9 lines 20-24).

Regarding claims 5-7 and 15-17, Matsuura et al disclose 1-dimensional and 2-dimensional photonic crystals (see page 8 line 29) comprising holes (air, see page 12 line 15).

Regarding claims 10 and 20, Matsuura et al disclose using piezoelectric to produce strain (see page 6 line 31).

Please note, regarding the method claims above, that method claims parallel article claims exactly without the introduction of any particular manufacturing methods, so that it is proper to examiner the article and method claims together.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 4 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lim et al and further in view of Scheuer et al (US 2004/0008942 A1).

As described above, Lim et al disclose the micro-ring resonator except a microracetrack resonator. Scheuer et al teach oval-like resonators are even more preferable since they provide an increased coupling as compared to a perfect circular ring resonator (see [0014]). Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use an oval-shaped resonator (microracetrack resonator) in Lim et al as taught by Scheuer et al for coupling efficiency.

9. Claims 2 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Matsuura et al and further in view of Caracci et al (U.S. Patent 6,445,838 B1).

Matsuura et al disclose using silicon-based substrates that can be physically deformed due to piezoelectric response but does not explicitly teach SiO₂ layer. Caracci et al that silica is expandable in response to the stimulus of heat or a piezoelectric material which is expandable in response to the stimulus of voltage. Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use silicon based substrate such as SiO₂ in Matsuura et al as taught by Caracci et al to tune the waveguide element.

10. Claims 8, 9, 18 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Matsuura et al.

Regarding claims 8, 9, 18 and 19, as described above Matsuura et al disclose the claimed invention except the claimed strain approximately 1% or 0.2%. Matsuura et al tuning of photonic crystal by stressing the membrane permits precise control of light

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traveling through the photonic bandgap waveguide (see page 3 lines 24-27, page 6 lines 1-8, and page 8 lines 26-30). Since Matsuura et al provide the same claimed structure and also teaches tuning of the photonic crystal precisely, it would have been obvious to one having ordinary skill in the art at the time the invention was made to tune the device with any desired tuning including the claimed tuning of approximately 1% or 0.2%, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art.

Please note, regarding the method claims above, that method claims parallel article claims exactly without the introduction of any particular manufacturing methods, so that it is proper to examine the article and method claims together.

Response to Arguments

11. Applicant's arguments filed on July 1, 2005 have been fully considered but they are not persuasive. Applicant argues that Lim et al (WO 02/25338) does not show a deformable membrane structure and Lim et al '338 is silent on a waveguide being formed on the deformable membrane. The Examiner does not agree with this. Lim et al clearly disclose a stress including element that changes shape (see claims 26 and 27) to tune a waveguide micro-resonator (see claims 29 and 33).

Applicant also argues that the Matsuura et al (WO 02/10843 A2) is silent on a waveguide being formed on a deformable membrane and also argues that there is no discussion forming a waveguide on a deformable element for tuning. The Examiner

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does not agree with this. Matsuura et teach tuning a photonic crystal formed on a deformable membrane (see Fig. 4) and Matsuura et al teach that a photonic crystal is used as a waveguide (see page 22 line 11).

Conclusion

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Williams (U.S. Patent 5,313,535) teach deforming piezo-electric material to alter the optical path length of the waveguide.

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Juliana K. Kang whose telephone number is (571) 272-2348. The examiner can normally be reached on Mon. & Fri. 10:00-6:00 and Tue. & Thur. 10:00-3:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Rod Bovernick can be reached on (571) 272-2344. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


JULIANA KANG
PRIMARY EXAMINER